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PRE-APPEAL BRIEF REQUEST FOR REVIEW	Docket Number (Optional) ITL.0995US (P16440)	
I hereby certify that this corespondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR	Application Number 10/669,206	Filed September 24, 2003
on May 15, 2006	First Named Inventor Mahesh R. Junnarkar et al.	
Signature Cynthia L. Hayden Typed or printed name Cynthia L. Hayden	Art Unit 2883	Examiner Dinh D. Chiem

Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.

This request is being filed with a notice of appeal.

The review is requested for the reason(s) stated on the attached sheet(s).
Note: No more than five (5) pages may be provided.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest.
See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☑ attorney or agent of record.
Registration number 28,994

☐ attorney or agent acting under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 ________

Signature

Timothy N. Trop
Typed or printed name

(713) 468-8880
Telephone number

May 15, 2006
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:		§		
	Mahesh R. Junnarkar et al.	§	Art Unit:	2883
		§		
Serial No.:	10/669,206	§	Examiner:	Dinh D. Chiem
		§		
Filed:	September 24, 2003	§	Docket:	ITL.0995US
		§		P16440
For:	Temperature Tuned Arrayed	§		
	Waveguide Grating	§	Assignee:	Intel Corporation
		§		

Mail Stop **AF**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

STATEMENT IN SUPPORT OF
PRE-APPEAL BRIEF REQUEST FOR REVIEW

Sir:

In the previous response, it was contended that the cited reference does not show an arrayed waveguide grating. Rather than contend that it does, it is asserted in the final rejection that the Applicants have argued limitations from the specification that are not in the claims.

However, it was the Applicants' intent to simply define what an arrayed waveguide grating is. But, perhaps, it should have sufficed to say that the cited reference does not show anything that could constitute an arrayed waveguide grating. An arrayed waveguide grating is a term of art. It cannot be applied without proper consideration of what one skilled in the art would consider to be an arrayed waveguide grating. What is shown in the present application is an arrayed waveguide grating. What is shown in the reference is not an arrayed waveguide grating and nothing in the reference suggests it is.

Date of Deposit: May 15, 2006
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as **first class mail** with sufficient postage on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Cynthia L Hayden

Cynthia L. Hayden

Therefore, the maintenance of the rejection, based on a reference that does not show an arrayed waveguide grating, is untenable. The characteristics of an arrayed waveguide grating are set forth in the first page of the specification and would be well known to one skilled in the art. See, for example, the highlighted, attached book excerpt. It is not any grating, but, rather, a grating that is called an arrayed waveguide grating. It includes an input waveguide, an output waveguide, and an array of waveguides of different length. This array of waveguides of different lengths connect between the input and the output waveguides. Nothing of the sort is shown in the cited reference and nothing that could possibly constitute an arrayed waveguide grating is cited there.

The best evidence of this is the fact that Dr. Deacon did not ever call anything that he did an arrayed waveguide grating. For example, in the Abstract, he says that what he has could be used in an arrayed waveguide grating. This clearly indicates that what is shown there was never intended to be an arrayed waveguide grating itself. Logically, it would make no sense to use an arrayed waveguide grating in an arrayed waveguide grating.

Therefore, reconsideration is respectfully requested.

Respectfully submitted,

Date: May 15, 2006

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We can also make NWDM and DWDM MUXs and DEMUXs using the FBT technique, but to do so two essential steps must be undertaken to fabricate good WDMs. First, manufacturers have to reduce the relatively high polarization-dependent loss by carefully controlling the fabrication process. Secondly, to achieve high isolation between very closely spaced channels, wavelength filters have to be added to the entire structure of the component [20]. These filters can be based on thin-film techniques or, as an alternative, fiber Bragg gratings can be used [21].

Another example of an all-fiber interferometric WDM coupler is a *WDM MUX/DEMUX based on the unbalanced Mach-Zehnder interferometer.* Such a structure is shown in Figure 13.9(c). (Also, see Figure 10.29.) In this case, not only the couplers themselves but the entire structure provides excellent wavelength-division multiplexing/demultiplexing. Take, for example, the demultiplexing of the two wavelengths shown in Figure 13.9(c). The first coupler splits the input signal equally and directs it along two paths having different lengths. The longer arm of the interferometer, having the additional length (ΔL), introduces an additional phase shift for both wavelengths. This phase shift can be calculated using the following formula (see references [6], and [7]):

$$\Delta\theta_i = [2\pi n_{\text{eff}} \Delta L]/\lambda_i = \beta\Delta L, \tag{13.25}$$

where the propagation constant (β) is defined by Formula 13.23. The key point here is that a light wave acquires an additional phase shift and waves at different wavelengths traveling the same extra distance (ΔL) experience different phase shifts. At coupler 2, two beams at λ_1 that have traveled different distances constructively interfere with each other. The result of this interference is that the maximum intensity of light at λ_1 is directed along fiber 1. At the same time, at coupler 2, the interference of two beams at wavelength λ_2 results in directing light at λ_2 along fiber 2. This is how wavelength-division multiplexing occurs.

Consider the power of the signals at both wavelengths. In conjunction with Formulas 13.11 and 13.12, we can write [7]:

$$P_1(\lambda_1)/P_{\text{in}} = \cos^2[\Delta\theta_1/2] \tag{13.26}$$

$$P_2(\lambda_2)/P_{\text{in}} = \sin^2[\Delta\theta_2/2] \tag{13.27}$$

Hence, making $\Delta\theta_1 = 2\pi\, n$, where n is an integer, we can direct all the power at wavelength λ_1 to output 1; on the other hand, making $\Delta\theta_2 = \pi\, m$, where m is another integer, we can direct all the power at wavelength λ_2 to output 2. Changing $\Delta\theta_i = [2\pi\, n_{\text{eff}}\, \Delta L]/\lambda_i$ is simple: We just control the length (ΔL) of the additional arm.

Since an interferometer is very sensitive to wavelength, the finesse of the wavelength division that can be achieved with this device is much better than what can be achieved with a simple FBT coupler.

Arrayed-waveguide-grating WDMs An arrayed-waveguide grating (AWG), also called a phased-arrayed waveguide (or phaser), is an interesting device. It is a kind of offshoot of a Mach-Zehnder interferometer but works like a diffraction grating. Its basic arrangement is shown in Figure 13.10.

An AWG is usually fabricated as a planar structure. (See Figure 13.5[c].) It consists of input and output waveguides, input and output WDM couplers, and arrayed waveguides, as Figure 13.10 shows. The length of any arrayed waveguide is distinguished from its adjacent waveguide by a constant ΔL. Wavelength channels enter the AWG, where an input WDM coupler splits them equally among the arrayed waveguides. Each portion of the input light traveling through an arrayed waveguide includes all the wavelengths that have entered the device. Each wavelength, in turn, acquires an individual phase shift determined by Formula 13.25. In addition,

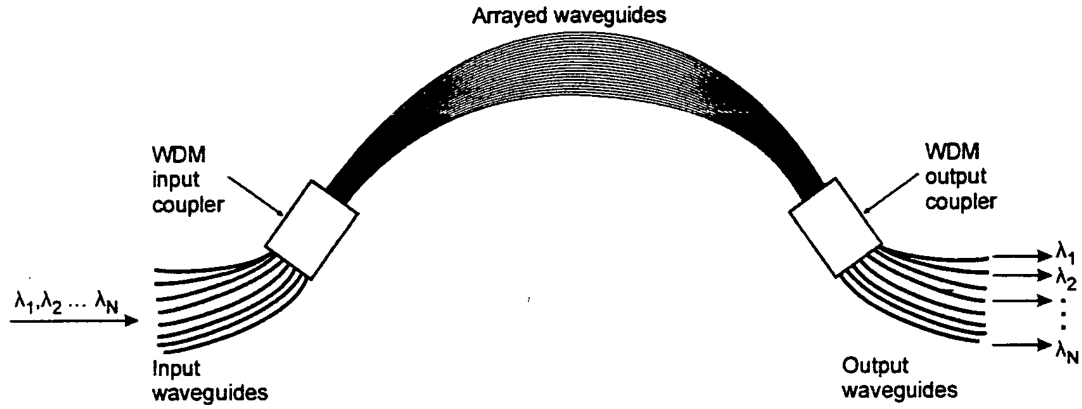

Figure 13.10 Arrayed-waveguide grating (AWG).

each wavelength receives phase shifts at the input and output couplers. As a result, every portion of light at a given wavelength acquires different phase shifts and all these portions interfere at the output coupler. The net result is a series, or set, of maximum light intensities. The direction of each maximum intensity depends on the wavelength. (From this standpoint, an AWG works very much like a diffraction grating, which will be discussed shortly.) Thus, each wavelength is directed into an individual fiber at the output of the device.

AWG MUXs and DEMUXs can combine and separate 48 channels (and more) and they provide multiplexing/demultiplexing of wavelength channels with spacing as low as 0.4 nm (50 GHz). All the other characteristics you will encounter in an AWG data sheet should be familiar to you through your reading of Figure 13.3 and our discussion of Figure 13.8.

Diffraction-grating WDMs A diffraction grating is a set of closely spaced slits. It can provide transmission or reflection of incident light. The distance between the slits (d) is called the grating *pitch* (period).

Let's see how a diffraction grating works [22]. Figure13.11(a) describes the principle of operation of a transmission diffraction grating.

Light from a light source (LED or LD) falls on the transmission diffraction grating as a plane wave. After passing through the individual grating slits, the light spreads in all directions. This is shown as a dotted semisphere in Figure 13.11. The interference of light with the same wavelength at the imaging plane (screen) results in a pattern of maximum and minimum intensity. The direction of the principal maximum intensity is given by

$$d \sin \Theta = m\lambda, \tag{13.28}$$

where $m = 0, \pm 1, \pm 2, \pm 3$, and so on. It is obvious that Formula 13.28 holds true for any wavelength.

Let's consider the first-order principal maxima, that is, $m = 1$. Thus, for wavelength λ_i we obtain the following expression from Formula 13.28:

$$\sin \Theta_i = \lambda_i / d, \tag{13.29}$$

which means that an individual wavelength has its principal maximum at a certain angle. In other words, the principal maxima of the different wavelengths are separated from one another by some angle. This is how a diffraction grating directs different wavelengths in different directions.